NC Project Food, Land & People

Correlation to the 2012 NC Essential Standards

~ S C I E N C E ~

Kindergarten

Forces and Motion

K.P.1 Understand the positions and motions of objects and organisms observed in the environment.

K.P.1 Compare the relative position of various objects observed in the classroom and outside using position words: above, behind, below, beside, between, in front of, on top of, under.

K.P.1.2 Give examples of different ways objects and organisms move: straight, zigzag, round and round, back and forth, fast and slow.

FLP: *School Ground Caretakers, p. 35* – Students observe and collect items on the school ground, choose their own special place, and work with school groundskeepers to be respectful caretakers of their outdoor environment. (i.e. observe animals & insects on schoolyard and watch how they move; observe raindrops falling from sky to schoolyard and watch how water flows downhill and/or forms puddles; use position words to describe these outdoor observations.)

Matter: Properties and Change

K.P.2 Understand how objects are described based on their physical properties and how they are used.

K.P.2.1 Classify objects by observable physical properties: size, color, shape, texture, weight & flexibility.

K.P.2.2 Compare the observable physical properties of different kinds of materials (clay, wood, cloth, paper, etc.) from which objects are made and how they are used.

FLP: *Seed Surprises, p. 5* – By sorting and planting seeds, students discover seeds come in a variety of sizes, shapes, and colors, as well as produce plants. (i.e. seeds are used to grow the same plants that produced them)

FLP: *Tomatoes to Ketchup, Chickens to Omelettes, p. 61* – Students build connections between raw and processed food items by cutting out pictures, matching pictures, and making collages. (i.e. apple to → applesauce, dried apples or jelly; corn to → popcorn, cereal or corn chips; dairy cow to → milk, cheese, butter, or ice cream)

Earth Systems, Structures and Processes

K.E.1 Understand change and observable patterns of weather that occur from day to day and throughout the year.

K.E.1.1 Infer that change is something that happens to many things in the environment based on observations made using one or more of their senses.

K.E.1.2 Summarize daily weather conditions noting changes that occur day to day and throughout the year.

K.E.1.3 Compare weather patterns that occur from season to season.

FLP: *School Ground Caretakers, p. 35* – Students observe and collect items on the school ground, choose their own special place, and work with school groundskeepers to be respectful caretakers of their outdoor environment.

FLP: *Seasons Through the Year, p. 53* – To build awareness of seasonal change, students use their own birthdates, a comparison of seasons in different settings, and self-made books.

Kindergarten continued…

Structures and Functions of Living Organisms

K.L.1 Compare characteristics of animals that make them alike and different from other animals and nonliving things.

K.L.1.2 Compare characteristics of living and non-living things in terms of: structure, growth changes, movement, basic needs.

FLP: *The Plant and Me, p. 1* – By discussing, observing, and role-playing, students learn that plants and people have similar needs for survival.

Grade 1

Earth Systems, Structures and Processes

1.E.2 Understand the physical properties of Earth materials that make them useful in different ways.

1.E.2.1 Summarize the physical properties of earth materials, including rocks, minerals, soils and water that make them useful in different ways.

1.E.2.2 Compare the properties of soil samples from different places relating their capacity to retain water, nourish and support the growth of certain plants.

FLP: *From Apple Cores to Healthy Soil, p. 149* - (This FLP lesson is designed for Grades 3-6 but can be adapted for Grade 1.) See page 151 "Getting Started and Session One #1-#3" where students compare soil samples and draw pictures of what they observe first with unaided eyes and then with a hand lens or magnifying glass.

FLP: *Perc Through the Pores, p.161 -* (This FLP lesson is designed for Grades 3-6 but can be adapted for Grade 1.) – See page 168 "The Feel of Soil" where students feel soil samples and identify the different textures of sand, silt and clay. See pages 164-5 "Extensions and Variations #1 A-C" where students pour water onto different soil samples and observe which drains water quickly and which holds more water for plants to use.

Ecosystems

1.L.1 Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive.

1.L.1.1 Recognize that plants and animals need air, water, light, space, food and shelter and that these may be found in their environment.

1.L.1.2 Give examples of how the needs of different plants and animals can be met by their environments in NC or different places throughout the world.

1.L.1.3 Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there.

FLP: *The Plant and Me, p. 1* – By discussing, observing, and role-playing, students learn that plants and people have similar needs for survival.

FLP: *Seed Surprises, p. 5* – By sorting and planting seeds, students discover seeds come in a variety of sizes, shapes, and colors, as well as produce plants. (i.e. Bird seed can be used to grow plants and extra seed can be placed in schoolyard birdfeeders to feed birds.)

FLP: *School Ground Caretakers, p. 35* – Students observe and collect items on the school ground, choose their own special place, and work with school groundskeepers to be respectful caretakers of their outdoor environment.

FLP: *Don't Use It All Up!, p. 81* - Students participate in a sponge demonstration to discover that people are consumers of resources and explore methods of conserving those resources. (i.e. water needed by plants, animals and humans.)

Grade 1 continued…

FLP: *Trash Bashing, p. 113* – By conducting a small group sorting activity, students learn the importance of reducing, reusing, and recycling solid waste. Students then develop plans to change personal behaviors.

Molecular Biology

1.L.2 Summarize the needs of living organisms for energy and growth.

1.L.2.1 Summarize the basic needs of a variety of different plants (including air, water, nutrients, and light) for energy and growth.

1.L.2.2 Summarize the basic needs of a variety of different animals (including air, water, and food) for energy and growth.

FLP: *Chewsy Choices, p. 9* – Students learn about the five food groups through the use of puppets and their participation in a play about dinner at Rachel and Brian's house. (i.e. if "animals" include humans and their basic needs for food nutrients for energy and growth.)

FLP: *Lunchtime Favorites, p. 103* – Students trace the sources of their food from lunch to learn the interdependence of plants, animals and people. They explore the importance of eating a variety of foods from plants and animals and discover how culture influences food choices.

Grade 2

Earth Systems, Structures and Processes

2.E.1 Understand patterns of weather and factors that affect weather.

2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water.

2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year.

FLP: *School Ground Caretakers, p. 35* – Students observe and collect items on the school ground, choose their own special place, and work with school groundskeepers to be respectful caretakers of their outdoor environment.

Structure and Functions of Living Organisms

2.L.1 Understand animal life cycles.

2.L.1.1 Summarize the life cycle of animals including: birth, developing into an adult, reproducing, aging and death.

FLP: *Buzzy, Buzzy Bee, p. 139* – Students play a game in which they pretend to be honeybees and apple trees. In the process, they learn about plant pollination. See page 140, paragraph 2 for bee life cycle: egg → larva → pupa → adult. See page 854 "Parts of an Insect" diagram of a bee.

Evolution and Genetics

2.L.2 Remember that organisms differ from or are similar to their parents based on the characteristics of the organism.

2.L.2.1 Identify ways in which plants and animals closely resemble their parents in observed appearance and ways they are different.

FLP: *Seed Surprises, p. 5* – By sorting and planting seeds, students discover seeds come in a variety of sizes, shapes, and colors, as well as produce plants. Students plant seeds and record observations. See page 7 "Session 4" where students create a class story or storybook about the sequence of plant growth from seed. See "Evaluation Options #2 and #3" where students draw a set of sequence pictures of seeds changing into plants and draw & label 3 kinds of seeds and how one of the seeds might look if it sprouted. If students don't know, then they'll plant seeds and watch them sprout and grow to find out! See "Extension #4" where students research what kind of "parent" plant their seeds become. Ex: acorn → oak tree.

FLP: *We're Into Pumpkins, p. 71* – Through hands-on, interdisciplinary activities, students learn about pumpkins as fruits and as food sources. Students discover the pumpkin's life cycle from seed to mature adult plant.

Grade 3

Energy: Conservation and Transfer

3.P.3 Recognize how energy can be transferred from one object to another.

3.P.3.2 Recognize that energy can be transferred from a warmer object to a cooler one by contact or at a distance and the cooler object gets warmer.

FLP: *From Apple Cores to Healthy Soil, p. 149* – A composting experiment reveals to students how soil organisms, temperature, air, and water are able to decompose organic waste and enrich soil. (i.e. when microbes--bacteria and fungi—eat and breakdown organic matter in the soil, they give off heat that can be measured in a compost pile.)

Earth Systems, Structures and Processes

3.E.2 Compare the structures of the Earth's surface using models or three-dimensional diagrams.

3.E.2.1 Compare Earth's saltwater and freshwater features (including oceans, seas, rivers, lakes, ponds, streams, and glaciers.

FLP: *Don't Use It All Up!, p. 81* - Students participate in a sponge demonstration to discover that people are consumers of resources and explore methods of conserving those resources. See page 84 "Session One" where students identify the Earth's total water supply and the Earth's total freshwater supply.

Structures and Functions of Living Organisms

3.L.2 Understand how plants survive in their environments.

3.L.2.1 Remember the function of the following plant structures as it relates to the survival of plants in their environments: Roots – absorb nutrients, Stems – provide support, Leaves – synthesize food, and Flowers – attract pollinators and produce seeds for reproduction.

FLP: *The Plant and Me, p. 1* – By discussing, observing, and role-playing, students learn that plants and people have similar needs for survival. See page 4 "Extensions and Variations #1" where students design their own experiments to show the impact of different variables on plants.

FLP: *Fruits and Veggies, p. 27* – Students identify and compare fruits and other edible plant parts through a fast-paced game. See page 29-30 "Extensions and Variations #1 and #2" where students create a bulletin board of edible plant parts and hold a veggie- and fruit-tasting party. (i.e. fruits are a plant structure and a "seed package" that humans eat for food energy, thus making the connection that plant survival is important to human survival.)

FLP: *We're Into Pumpkins, p. 71* – Through hands-on, interdisciplinary activities, students learn about pumpkins as fruits and as food sources. See page 853 "Parts of a Plant".

FLP: *Root, Root for Life, p. 125* – Students discover the importance of roots to plants, soil and people during hands-on learning-station activities.

FLP: *Buzzy, Buzzy Bee, p. 139* – Students play a game in which they pretend to be honeybees and apple trees. In the process, they learn about plant pollination. See page 146 for "Parts of a Flower."

FLP: *Tree-mendous!, p. 195* – Students play a fast-paced word classification game that helps them gain an appreciation for the variety of ways people use and benefit from trees. (i.e. trees are super-sized plants adapted with specific plant structures to ensure their survival.)

3.L.2.2 Explain how environmental conditions determine how well plants survive and grow.

FLP: *Fruits and Veggies, p. 27* – Students identify and compare fruits and other edible plant parts through a fast-paced game. See page 30 "Extensions and Variations #9" where students research different environmental conditions that familiar fruits and veggies need to grow.

Grade 3 continued…

FLP: *School Ground Caretakers, p. 35* – Students observe and collect items on the school ground, choose their own special place, and work with school groundskeepers to be respectful caretakers of their outdoor environment. (i.e. students observe environmental conditions on schoolyard and assess how well plants survive and grow.)

FLP: *We're Into Pumpkins, p. 71* – Through hands-on, interdisciplinary activities, students learn about pumpkins as fruits and as food sources. See pages 76-77 "Extensions and Variations #8" where students visit a pumpkin patch to observe pumpkin-growing conditions.

FLP: *Your School Ground Through New Eyes, p. 285* – Students develop and sharpen observation skills to discover new details about their school ground and form fresh perceptions of their outdoor space. See page 289 "Session 3" where students view school ground through investigator's or scientist's eyes" to observe and describe the diversity of plant and animal life on the school ground.

3.L.2.3 Summarize the distinct stages of the life cycle of seed plants.

FLP: *Seed Surprises, p. 5* – By sorting and planting seeds, students discover seeds come in a variety of sizes, shapes, and colors, as well as produce plants. Students plant seeds and record observations. See page 7 "Session 4" where students create a class story or storybook about the sequence of plant growth from seed. See "Evaluation Options #2 and #3" where students draw a set of sequence pictures of seeds changing into plants and draw & label 3 kinds of seeds and how one of the seeds might look if it sprouted.

FLP: *Banking on Seeds, p. 169* – The critical role that seeds play in the world is explored through creating a seed bank and comparing uses of seeds. See page 180 "Parts of a Seed" that describes each part's function and the stages of a seed's growth.

3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.

FLP: *School Ground Caretakers, p. 35* – Students observe and collect items on the school ground, choose their own special place, and work with school groundskeepers to be respectful caretakers of their outdoor environment. (i.e. students observe soil on the schoolyard and assess its ability to support the growth and survival of plants.)

FLP: *Perc Through the Pores, p.161* – By pretending to become soil particles and water droplets, students simulate soil particle sizes and their pore space. See page 168 "The Feel of Soil" where students feel soil samples and identify the different textures of sand, silt and clay. See pages 164-5 "Extensions and Variations #1 A-C" where students pour water onto different soil samples and observe which drains water quickly and which holds more water for plants to use.

Grade 4

Earth History

4.E.2 Understand the use of fossils and changes in the surface of the earth as evidence of the history of the Earth and its changing life forms.

4.E.2.3 Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering and rapid processes such as landslides, volcanic eruptions, and earthquakes.

FLP: *Till We or Won't We?, p. 351* – Students construct and perform experiments simulating rain on a field, investigating how soil preparation, tillage techniques, and mulches affect soil erosion and water runoff.

Continued …

Grade 4 continued…

Ecosystems

4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.

4.L.1.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.
4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment.

FLP: *Buzzy, Buzzy Bee, p. 139* – Students play a game in which they pretend to be honeybees and apple trees. In the process, they learn about plant pollination. Introduce current issue of colony collapse disorder and honeybee die-offs.

FLP: *Investigating Insects, p. 273* – Students become entomologists by observing insects in their nearby surroundings. After observing and analyzing, they learn by playing a game how some insect interactions can be useful to people.

4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g. recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion.)

FLP: *School Ground Caretakers, p. 35* – Students observe and collect items on the school ground, choose their own special place, and work with school groundskeepers to be respectful caretakers of their outdoor environment.

FLP: *Don't Use It All Up!, p. 81* - Students participate in a sponge demonstration to discover that people are consumers of resources and explore methods of conserving those resources.

FLP: *Germ Busters, p. 91* – Through a controlled experiment, students learn one way bacteria can spread and the importance of hand washing for personal hygiene and food safety. Introduce the concept of resistant bacteria or "super bugs" from the overuse of antibacterial soap and cleansers. Scientists recommend people use regular soap to kill bacteria.

FLP: *Trash Bashing, p. 113* – By conducting a small group sorting activity, students learn the importance of reducing, reusing, and recycling solid waste. Students then develop plans to change personal behaviors.

FLP: *From Apple Cores to Healthy Soil, p. 149* – A composting experiment reveals to students how soil organisms, temperature, air, and water are able to decompose organic waste and enrich soil.

FLP: *Banking on Seeds, p. 169* – The critical role that seeds play in the world is explored through creating a seed bank and comparing uses of seeds.

FLP: *Your School Ground Through New Eyes, p. 285* – Students develop and sharpen observation skills to discover new details about their school ground and form fresh perceptions of their outdoor space. Care and stewardship of the schoolyard are covered in "Session Five (#1-#6)" on pages 290-291, "Session Six (#1-#4)" on page 291-292, and "Extensions and Variations" on page 292.

FLP: *In Harmony, p.297* - Students develop mapmaking, map reading, and graph reading skills as they learn the capabilities and limitations of our land resources by using a soil survey. In the process students begin to build a foundation for understanding the complex issues involved in making land use decisions in harmony with the land's capability.

FLP: *Amazing Grazing, p. 307* - Students learn about the efficient use of renewable resources to meet human need in this lesson. Five small groups of students build a food system to meet their needs, which is based on the capability of their land resource, climate, topography, and economics. The lesson provides information that directs students to understand why grazing is an environmentally sound option in each scenario.

FLP: *Till We or Won't We?, p. 351* – Students construct and perform experiments simulating rain on a field, investigating how soil preparation, tillage techniques, and mulches affect soil erosion and water runoff.

Grade 4 continued…

Molecular Biology

4.L.2 Understand food and the benefits of vitamins, minerals and exercise.

4.L.2.1 Classify substances as food or non-food items based on their ability to provide energy and materials for survival, growth, and repair of the body.

4.L.2.2 Explain the role of vitamins and minerals, and exercise in maintaining a healthy body.

FLP: *Chewsy Choices, p. 9* – Students learn about the five food groups through the use of puppets and their participation in a play about dinner at Rachel and Brian's house. (i.e. if "animals" include humans and their basic needs for food nutrients for energy and growth.)

FLP: *Fruits and Veggies, p. 27* – Students identify and compare fruits and other edible plant parts through a fast-paced game.

FLP: *Lunchtime Favorites, p. 103* – Students trace the sources of their food from lunch to learn the interdependence of plants, animals and people. They explore the importance of eating a variety of foods from plants and animals and discover how culture influences food choices.

FLP: *Root, Root for Life, p. 125* – Students discover the importance of roots to plants, soil and people during hands-on learning-station activities. Students learn that roots are a nutritious food source for people and other animals. See "Session Two #3" on pages 128-129; "Session Three (#1-#3)" on page 129; and "Extensions and Variations #4" on page 130.

FLP: *Be Label Able, p. 363* – Students graph the weight of several nutritional components identified on cereal box labels to select the healthiest cereal. They use this information to design and market a new healthy cereal.

FLP: *Breads Around the World, p. 381* – Students learn the cultural and nutritional significance of bread throughout the world by working in groups to solve a logic-matrix activity.

FLP: *What's the Shape of Your Diet?, p. 469* – Students collect data on the foods they eat over a 24-hour period and compare their consumption to the Food Guide Pyramid (or "My Plate") to determine if their food choices create a nutritionally sound diet.

Grade 5

Energy: Conservation and Transfer

5.P.3 Explain how the properties of some materials change as a result of heating and cooling.

5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation)

5.P.3.2 Explain how heating and cooling affect materials and how this relates to their purpose and practical applications.

FLP: *From Apple Cores to Healthy Soil, p. 149* – A composting experiment reveals to students how soil organisms, temperature, air, and water are able to decompose organic waste and enrich soil. (i.e. when microbes--bacteria and fungi—eat and breakdown organic matter in the soil, they give off heat that can be measured in a compost pile.)

Mechanisms of Heat Loss (from Cornell University)

The temperature at any point during composting depends on how much heat is being produced by microorganisms, balanced by how much is being lost through conduction, convection, and radiation. Through *conduction*, energy is transferred from atom to atom by direct contact; at the edges of a compost pile, conduction causes heat loss to the surrounding air molecules.

Grade 5 continued…

Convection refers to transfer of heat by movement of a fluid such as air or water. When compost gets hot, warm air rises within the system, and the resulting convective currents cause a steady but slow movement of heated air upwards through the compost and out the top. In addition to this natural convection, some composting systems use "forced convection" driven by blowers or fans. This forced air, in some cases triggered by thermostats that indicate when the piles are beginning to get too hot, increases the rates of both conductive and convective heat losses. Much of the energy transfer is in the form of latent heat -- the energy required to evaporate water. You can sometimes see steamy water vapor rising from hot compost piles or windrows.

The third mechanism for heat loss, *radiation*, refers to electromagnetic waves like those that you feel when standing in the sunlight or near a warm fire. Similarly, the warmth generated in a compost pile radiates out into the cooler surrounding air. The smaller the bioreactor or compost pile, the greater the surface area-to-volume ratio, and therefore the larger the degree of heat loss to conduction and radiation. Insulation helps to reduce these losses in small compost bioreactors.

Moisture content affects temperature change in compost; since water has a higher specific heat than most other materials, drier compost mixtures tend to heat up and cool off more quickly than wetter mixtures, providing adequate moisture levels for microbial growth are maintained. The water acts as a kind of thermal flywheel, damping out the changes in temperature as microbial activity ebbs and flows.

FLP: *Could It Be Something They Ate?, p. 181* – Students experiment with the growth of microbes and predict who would become ill from eating contaminated food by analyzing the food-handling behavior of a group of picnickers. Students learn it's best practice to keep hot foods hot and cold foods cold as heat, refrigeration and freezing prevent mold and bacteria growth.

Ecosystems

5.L.2 Understand the interdependence of plants and animals with their ecosystem.

5.L.2.2 Classify the organisms within an ecosystem according to the function they serve: Producers, consumers, or decomposers (biotic factors.)

5.L.2.2 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

FLP: *Lunchtime Favorites, p. 103* – Students trace the sources of their food from lunch to learn the interdependence of plants, animals and people. They explore the importance of eating a variety of foods from plants and animals and discover how culture influences food choices.

FLP: *From Apple Cores to Healthy Soil, p. 149* – A composting experiment reveals to students how soil organisms, temperature, air, and water are able to decompose organic waste and enrich soil. (i.e. the role of decomposers in cycling nutrients for all living plants and animals in the ecosystem.)

FLP: *Gifts from the Sun, p. 325* – Through creating and improvising, students learn the components and basic process of photosynthesis. (i.e. Animals and humans depend on producers such as plants, algae and a few bacteria to capture the sun's radiant energy and transform it into chemical energy that they can consume. And decomposers consume their nutrient energy from dead plants and animals.)

Evolution and Genetics

5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism.

5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.

5.L.3.2 Give examples of likenesses that are inherited and some that are not.

FLP: *Banking on Seeds, p. 169* – The critical role that seeds play in the world is explored through creating a seed bank and comparing uses of seeds. See "Getting Started" on page 173 that explains how hybrid seeds are bred to grow into plants that have the best qualities of each parent. Seeds of hybrid parents will not breed true and will revert back to the traits of the inbred lines from which they were created. Therefore, seeds from hybrid plants cannot be saved to produce those same outstanding plants but must be constantly created a new.

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